

TAIWANESE SPECIES OF *NEOPANORPA*
(INSECTA: MECOPTERA: PANORPIDAE)GEORGE W. BYERS¹

ABSTRACT

Neopanorpa youngi n. sp. is described and illustrated. It is compared in detail with *N. ophthalmica* Navas and *N. gradana* Cheng. All known Taiwanese species of *Neopanorpa* are differentiated in separate keys for males and females, and all are illustrated by taxonomic details.

INTRODUCTION

Taiwan (formerly Formosa) has a surprisingly rich fauna of Mecoptera, including numerous species of *Panorpa* and fewer of *Neopanorpa* and *Bittacus*. The island has an area of nearly 36,000 km² (13,836 sq mi). Except for an alluvial plain about 30 km wide along its western side, it is largely mountainous, much of its area above 1500 m and several peaks rising above 3500 m. But Taiwan is crossed at midlength by the Tropic of Cancer. As a result, it has a diversity of habitats, ranging from lowland tropical rain forest to high montane forest and grassland. This has undoubtedly influenced the variety of its insect fauna.

Neopanorpa includes approximately 95 species at present, all in southeastern Asia. The ranges of species seldom overlap, but I suspect this is due to insufficient collecting. Species of *Neopanorpa* occur in India, Nepal, Bhutan, and Sikkim, eastward through Burma, Thailand, Laos, and Vietnam to southern China, chiefly south of 35° latitude, and southeastward through peninsular Malaysia to Sumatra, Java, and Borneo. Much of this composite range overlaps that of the more boreal genus *Panorpa*.

In *Neopanorpa*, the wings are more slender, particularly near their bases, than in *Panorpa*. Vein 1A in the fore wing is relatively short (around 25% of wing length) and ends at the wing margin before the level of the origin of the radial sector (ORs). In *Panorpa*, 1A extends well beyond the level of ORs and is often more than 40% as long as the entire fore wing. There are correlated differences in both male and female genital structures as well, but these are not easily described in this limited treatment.

The genus *Neopanorpa* is represented in Taiwan by at least nine species. Navás (1911) named two of these as *Campodotecnum formosanum* and *C. ophthalmicum*; but Enderlein's genus *Campodotecnum* was subsequently relegated to the synonymy of *Neopanorpa* (Esben-Petersen, 1913). In 1912, Esben-Petersen described *Panorpa sauteri*, which was later transferred to *Neopanorpa*. Issiki (1927) added *N. makii* and *N. magna*; and Issiki and Cheng (1947) described *N. dispar*. Cheng (1952) named *N. gradana* and *N. k-maculata*. On a recent collecting trip to Taiwan, Dr. C. W. Young found the ninth species, described here.

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Neopanorpa youngi, new species

Description based on four males, three females, pinned.

Head. — Dorsum mostly piceous from area around ocelli backward onto occiput; dark yellowish brown along margins of eyes. Rostrum amber-brown; mouthparts yellowish brown except tips of maxillary palpi black. Scape and pedicel yellowish brown, flagellum brown to dark brown, with 42–44 flagellomeres (number may vary in one individual). Antennal length about 12–13 mm.

Thorax. — Pronotum unevenly dull yellowish brown, with diffuse black medial band. Mesonotum and metanotum mostly sordid yellowish brown, with piceous medial stripe that widens abruptly across anterior mesonotum. Pleural areas, coxae, and mera dull pale yellowish brown, with small, darkly sclerotized spots at coxal articulations and below wing bases. Hairs of pleura short and pale, longer on anterior surfaces of middle and hind coxae. Legs yellowish brown; tarsi darkening gradually to brown on apical tarsomeres.

Wings strongly tinged with yellowish brown, bands and spots brown. Apical band enclosing one or two small to large pale areas. Pterostigmal band complete, branched posteriorly near midlength; a slender, irregular, diagonal band connecting inner (basal) branch of pterostigmal band to marginal spot. Basal band entire (holotype) or interrupted near M, connected in some individuals by slender, diagonal band to marginal spot.

Abdomen of Male. — Terga 2–4 mostly black; posterior prolongation of tergum 3 (part of notal organ) dark yellowish brown, highly arched dorsad (Fig. 4); median elevation on tergum 4 black, bluntly bilobed, with hairs directed cephalad. Tergum 5 and segment 6 unevenly dark yellowish brown; sterna 2–5 pale yellowish brown. Segments 7–9 yellowish brown except for brown shading on sides of hypovalves. Ninth tergum distinctly bilobed at apex (Fig. 7), extending far beyond ends of basistyles (Fig. 3). Ninth sternum wide in ventral aspect, about 80% of greatest width of genital bulb measured across basistyles. Hypoalves (Fig. 1) narrowly rounded apically, appearing nearly acute, mesal edges rolled at base; blunt lobe on dorsal surface of each (Fig. 2) extending between basistyles, thus not evident in lateral aspect (Fig. 3). Dististyles slender, not strongly curved toward apex, each with sharply tipped inner basal lobe (Fig. 5). Aedeagus (Fig. 6) with two strongly bowed ventral appendages approximately in position of ventral parameres (but possibly homologous with branches from parameres forming aedeagal hamulus in *Panorpa*; see Byers, 1993), each terminating in pale, wrinkled lobe directed abruptly laterad at nearly right angle to bowed part of appendage. Ventral valves strigose; lateral processes continuous with ventral parameres; dorsal parameres inclined together, with uneven, almost truncate ends.

Abdomen of Female. — Terga 2–5 piceous-black, corresponding sterna pale yellowish brown; tergum 6 dark yellowish brown, following segments yellowish brown. Well-developed laterotergites on segments 7 and 8. Cerci (Fig. 22) two-segmented, apical segment about three times as long as basal one. Subgenital plate (Fig. 21) notched apically, with median basal membranous indentation; most hairs short, 10–12 long marginal and apical setae. Genital plate (Fig. 19, 20) with short oval axial portion bearing thick, darkened lateral lobes conspicuously expanded dorsad; spatulate arms subparallel.

Body length, male, about 13–14.5 mm (holotype 13 mm); female about 12–13 mm (allotype 13 mm). Length of fore wing, male, 13.9–15.3 mm (holotype 13.9 mm); female 13.2–15.0 mm (allotype 15.0 mm).

Holotype, male, "Taiwan: Kaohsiung, Shanping. 640 m., 11–20 April 1988, J.

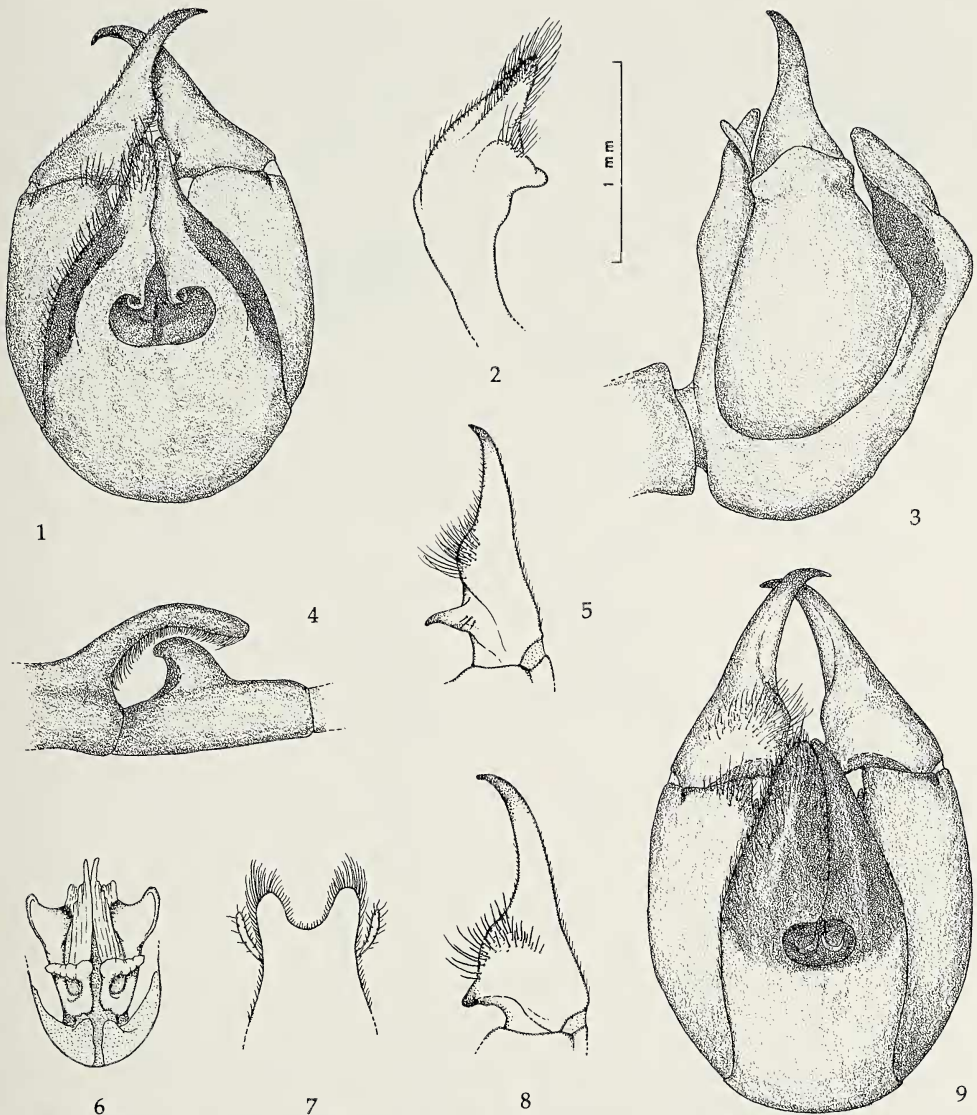


Fig. 1-7.—*Neopanorpa youngi*, n. sp. 1, genital bulb, male paratype, ventral aspect. 2, right hypovalve, male, right lateral aspect. 3, genital bulb, paratype, left lateral aspect. 4, notal organ of abdominal terga 3 and 4, left lateral aspect. 5, right dististyle, male, ventral (and slightly lateral) aspect. 6, aedeagus, male paratype, ventral aspect. 7, ninth abdominal tergum, male, dorsal aspect (diagrammatic). Fig. 8-9. *Neopanorpa ophthalmica*, male syntype (Museum of Zoology, Barcelona). 8, right dististyle, ventral aspect. 9, genital bulb, ventral aspect. Scale: Fig. 1-3, 5-9.

Rawlins, C. Young, R. Davidson." Allotype, two female and one male paratypes, same data as holotype; one male paratype same locality but 21-30 April 1988, C. Young, R. Davidson, J. Rawlins; one male paratype same locality but 1-10 May 1988, R. Davidson, C. Young, J. Rawlins. Holotype, allotype, one male and two female paratypes in the Carnegie Museum of Natural History, Pittsburgh, Pennsylvania; two male paratypes in the Snow Entomological Museum, Univer-

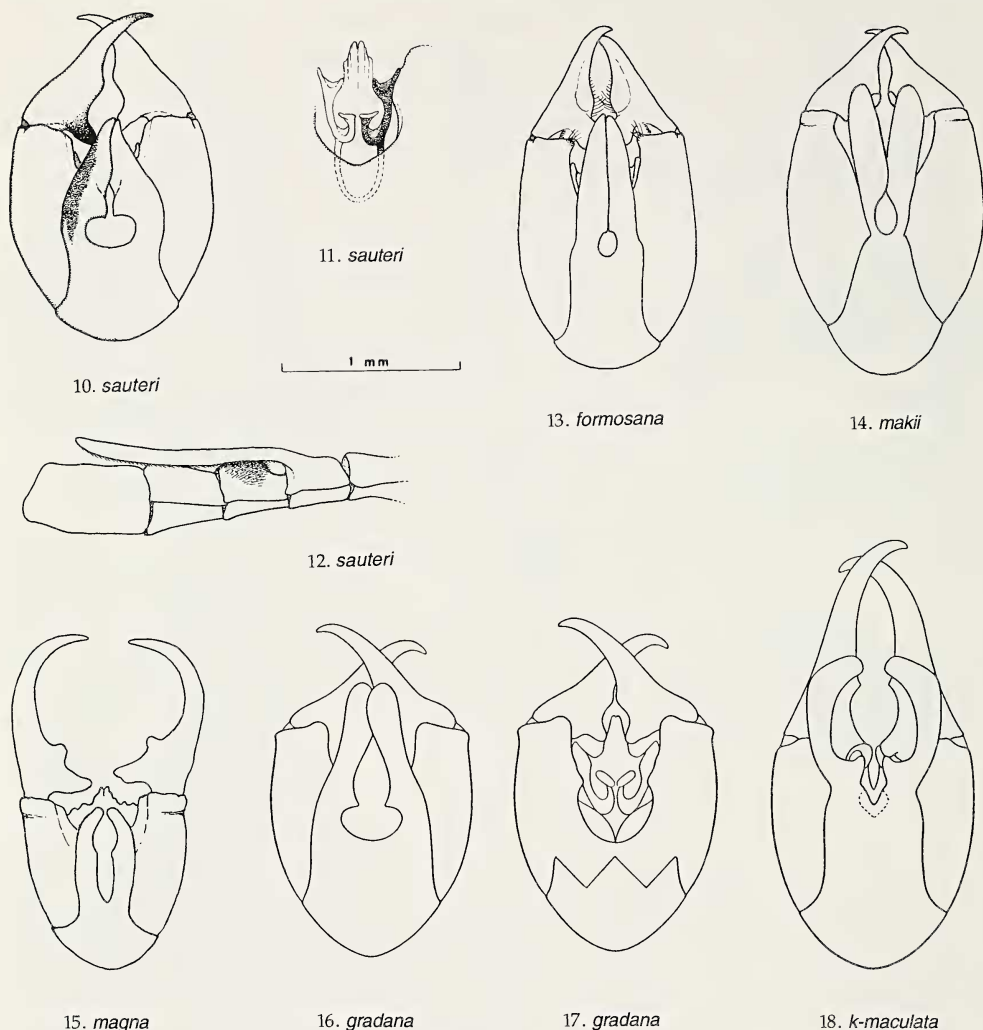


Fig. 10-18.—Taxonomic details of males of Taiwanese species of *Neopanorpa*. 10, genital bulb, *N. sauteri*, ventral aspect. 11, aedeagus, *N. sauteri*, ventral aspect. 12, abdominal segments 2-6, male holotype of *N. sauteri* (Deutsches Entomologisches Institut, Berlin-Friedrichshagen), right lateral aspect, anterior at right (genital bulb missing). 13, genital bulb, *N. formosana*, male syntype (Museum of Zoology, Barcelona), ventral aspect. 14, genital bulb, *N. makii*, after Issiki 1927. 15, genital bulb, *N. magna*, after Issiki 1927. 16, genital bulb, *N. gradana*, from Cheng 1952. 17, same, with hypoalves removed to show aedeagus, from Cheng 1952. 18, genital bulb, *N. k-maculata*, from Cheng 1952. Scale: Fig. 10-13.

sity of Kansas, Lawrence, Kansas. The holotype is intact; the allotype is missing the apical one-third of the right antenna, and its terminal abdominal segments are dissected and mounted in polyvinyl alcohol, on the pin with the specimen.

This species is named for my friend and former student, Dr. Chen-Wen Young of the Carnegie Museum of Natural History, who collected most of the specimens. A native of Taiwan, Dr. Young is an outstanding field entomologist and collector and a very capable taxonomist of Tipulidae.

Neopanorpa youngi superficially resembles *N. ophthalmica*, particularly in wing

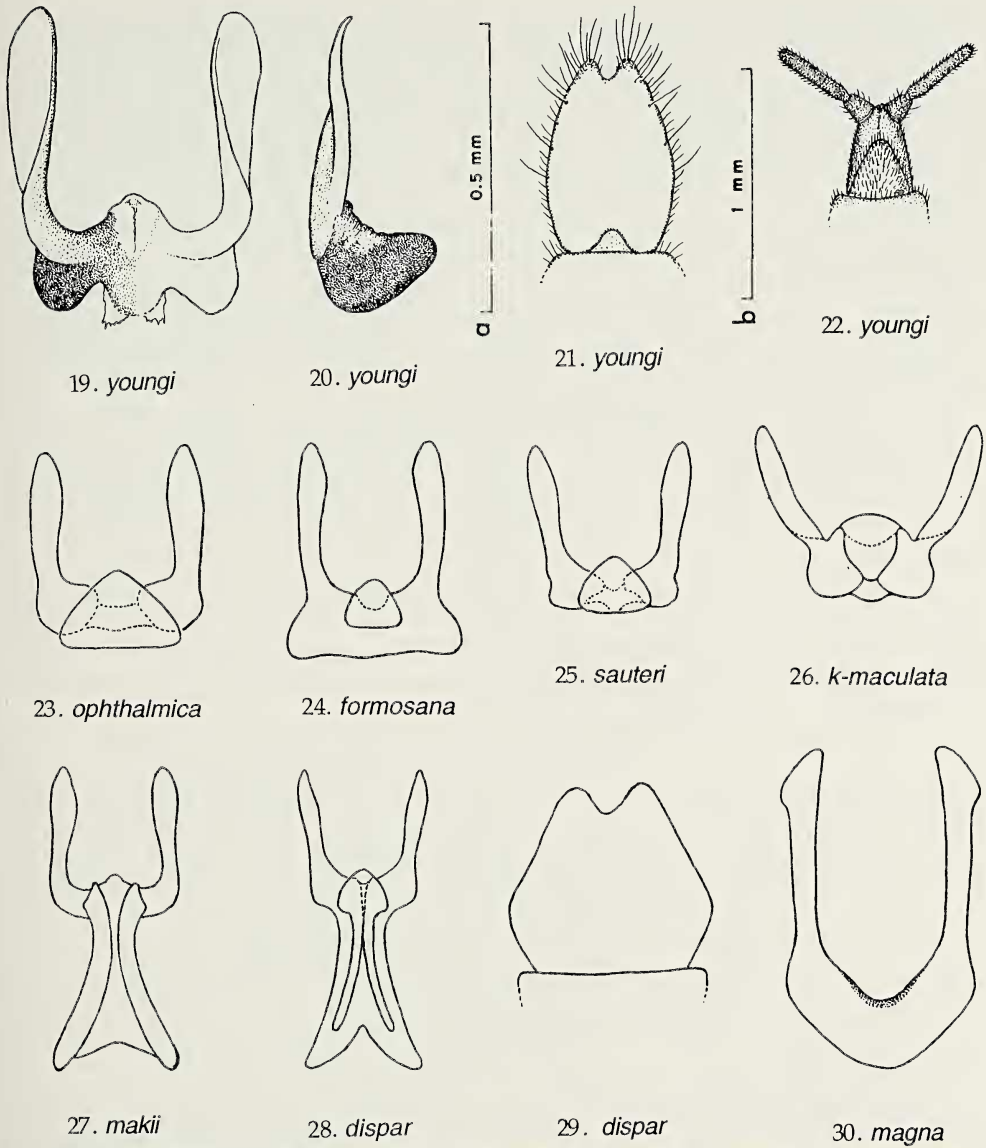


Fig. 19–30.—Taxonomic details of females of Taiwanese species of *Neopanorpa*. 19, genital plate, female allotype of *N. youngi*, n. sp., ventral aspect. 20, same, right lateral aspect. 21, subgenital plate, allotype of *N. youngi*, ventral aspect. 22, terminal abdominal segment and cerci, allotype of *N. youngi*, ventral aspect. 23, genital plate, *N. ophthalmica*, ventral aspect. 24, same, *N. formosana*. 25, same, *N. sauteri*. 26, same, *N. k-maculata*. 27, same, *N. makii*. 28, same, *N. dispar*. 29, subgenital plate, *N. dispar*, ventral aspect. 30, genital plate, *N. magna*, ventral aspect. Fig. 23–30 after Issiki and Cheng 1947. Scale a—Fig. 19, 20; scale b—Fig. 21, 22.

pattern and the subtriangular shape of the male's hypovalves. The hypovalves in *ophthalmica*, however, are wider, less acutely tipped, uniformly dark and with more and longer hairs than those of *youngi*. A conspicuous difference in the genital bulb of the males is with the width of the ninth sternum (hypandrium) in ventral

aspect (Fig. 1, 9). In *youngi*, the width of the sternum is approximately 80% of the greatest width of the genital bulb measured across the basistyles, while in *ophthalmica* it is only about 50–55% (but nearly 68% in *N. gradana*). Differences between *youngi* and both *ophthalmica* and *gradana* include the inner basal lobe of the dististyle, sharply acute in *youngi* but relatively blunt in *ophthalmica* (Fig. 8) and *gradana* (Fig. 17), and the apex of the ninth tergum, with distinct lobes separated by a U-shaped emargination in *youngi* but only shallowly indented, virtually truncate in *ophthalmica* and *gradana*, thus without lobes. In aedeagal structure, *youngi* resembles *sauteri* and *gradana* (compare Fig. 6, 11, and 17). The most obvious difference is in the up-curved ventral appendages I interpret as ventral parameres, the ends of which are enlarged, directed laterally, and pale in *youngi* but flat and disc-like in *sauteri* (actually widened slightly ventrad, or caudad). Cheng (1952) described the distal ends of these appendages in *gradana* (Fig. 17) simply as “broad lobes.”

Females of *N. youngi* differ from those of all other known Taiwanese species in the genital plate, particularly the large, blackened dorsal swelling at each side, at the bases of the posterior arms. Cheng (1952) described somewhat similar structures in *N. k-maculata* as “black and stout,” but I cannot interpret his illustration (Fig. 26) in more detail. Such basal enlargements are not mentioned in the descriptions of other species. The ovoid shape of the axial portion of the plate is also not seen in other Taiwanese species. The apically notched subgenital plate (Fig. 21) of *N. youngi* is scarcely different from its counterpart in several other species; the membranous medial area at the base has not been mentioned or illustrated for other species.

SPECIES IDENTIFICATION

Since I have not seen specimens of some species of *Neopanorpa* from Taiwan, I have relied on descriptions and illustrations provided by S. Issiki and F. Y. Cheng. A few figures drawn by Dr. Cheng have in fact been copied directly from his paper in *Psyche*, with permission of the current editor, Dr. David Furth.

KEY TO MALES OF TAIWANESE *NEOPANORPA*

(Note: Male of *N. dispar* Issiki and Cheng is unknown.)

1. Hypovalves long-elliptical in ventral aspect, slightly overlapped medially (Fig. 13, 14) 2
- 1'. Hypovalves subtriangular in ventral aspect, or rounded at apex, overlapped medially or apically or not overlapped 3
- 2(1). Apical band on fore wing connected to pterostigmal band along costal margin *formosana* Navás
- 2'. Apical band on fore wing narrowly connected to pterostigmal band along vein R₃ *makii* Issiki
- 3(1'). Hypovalves not overlapped, either medially or apically 4
- 3'. Hypovalves overlapped along mesal edges or at apex 5
- 4(3). Hypovalves long, extending far beyond ends of basistyles, bowed laterad (Fig. 18), with small mesal lobe near base of each; sternum 9 prolonged so that hypovalves originate shortly before ends of basistyles; dististyles only slightly curved, outer margins shallowly concave *k-maculata* Cheng
- 4'. Hypovalves short, almost straight, without mesal lobe near base, their apices slightly narrowed and inclined mesad; sternum 9 not prolonged,

- hypoalves terminating near level of ends of basistyles; dististyles (Fig. 15) longer than basistyles, strongly bowed outward (laterad) *magna* Issiki
- 5(3'). Ninth abdominal tergum (epiandrium) shallowly emarginate apically, almost truncate 6
- 5'. Ninth abdominal tergum distinctly bilobed, with lobes separated by deep U-shaped emargination 7
- 6(5). Hypoalves nearly acute at apex, subtriangular in ventral aspect, overlapped slightly along most (about 70%) of their length *ophthalmica* Navás
- 6'. Hypoalves rounded at apex, narrower at midlength than at apex, overlapped only apically for about 30% of their length (Fig. 16) *gradana* Cheng
- 7(5'). Median projection from third abdominal tergum (notal organ) extending over terga 4, 5, and most of 6 (Fig. 12); inner basal lobe of dististyle blunt at apex *sauteri* Esben-Petersen
- 7'. Median projection from third abdominal tergum extending only over two-thirds of tergum 4; apex of inner basal lobe of dististyle acutely pointed *youngi*, n. sp.

KEY TO FEMALES OF TAIWANESE *NEOPANORPA*

(Note: Female of *gradana* Cheng is unknown; its position in this key is based mainly on the wing pattern of the male.)

1. Marginal spot in fore wing not extended to join basal (proximal) branch of pterostigmal band 2
- 1'. Marginal spot in fore wing extended diagonally across wing to join basal branch of pterostigmal band 6
- 2(1). Genital plate with well-developed anterior apodemes (Fig. 27, 28) ... 3
- 2'. Genital plate without evident anterior apodemes 4
- 3(2). Length of subgenital plate of eighth sternum approximately equal to its greatest width (Fig. 29) *dispar* Issiki and Cheng
- 3'. Length of subgenital plate about 1.3 times its greatest width *makii* Issiki
- 4(2'). Apical band of fore wing including extensive pale spots from cell R₂ to cell M₁; wing markings grayish brown *gradana* Cheng
(see Note above)
- 4'. Apical band entire or including only small pale spots; wing markings dark brown to blackish brown 5
- 5(4'). Genital plate without distinct axial portion, arms abruptly widened subapically (Fig. 30); body largely black *magna* Issiki
- 5'. Genital plate with distinct axial portion (Fig. 24); arms gradually widened subapically; body color mainly brown *formosana* Navás
- 6(1'). Band of pigment from marginal spot to pterostigmal band broad with rather even edges, narrowest part as wide as distance between M₁₊₂ and M₃ where bands join *k-maculata* Cheng
- 6'. Connection between marginal spot and pterostigmal band of varying widths but mostly slender, with irregular edges 7
- 7(6'). Axial portion of genital plate broadly triangular in ventral aspect (Fig. 23, 25) 8
- 7'. Axial portion of genital plate ovoid (Fig. 19) *youngi*, n. sp.

- 8(7). Arms of genital plate (apical plate) slightly divergent (Fig. 25); axial portion narrower than distance between arms . . . *sauteri* Esben-Petersen
 8'. Arms of genital plate approximately parallel (Fig. 23); axial portion wider than distance between arms *ophthalmica* Navás

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